

CLAIMS

- 1 1. A system for generating a frequency weighting (FW) matrix for use in a Fine-
2 Granularity-Scalability (FGS) video coding system, comprising:
3 a system for generating average discrete cosine transform (DCT) residuals for a
4 sample video frame encoded both at a predetermined base layer bit-rate and at
5 approximately three times the predetermined base layer bit-rate;
6 a system for plotting a difference curve of the generated average DCT residuals,
7 wherein the difference curve is plotted by DCT coefficient locations corresponding to a
8 DCT zigzag scan line; and
9 a system for matching a staircase curve to the difference curve.
- 1 2. The system of claim 1, wherein values on the staircase curve at each DCT coefficient
2 location are mapped into the FW matrix at locations corresponding to the DCT zigzag
3 scan line.
- 1 3. The system of claim 2, further comprising a weight adjustment system [21] for
2 altering the staircase curve when the weights determined from the staircase curve are
3 larger than an upper limit of a number of bit planes in the FGS video coding system.
- 1 4. The system of claim 1, wherein the sample video frame is selected from a sample
2 video sequence having a predetermined scene characteristic.

1 5. The system of claim 4, wherein the predetermined scene characteristic comprises a
2 criterion selected from a group consisting of: a brightness level, a motion level, and an
3 activity level.

1 6. The system of claim 1, wherein the predetermined base layer bit-rate is application,
2 resolution, and frame rate dependent.

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7. A method of generating a frequency weighting (FW) matrix for use in a Fine-Granularity-Scalability (FGS) video coding system, comprising the steps of:

- generating a first plot of average discrete cosine transform (DCT) residuals versus a zigzag DCT scan line location for a sample video frame encoded at a first bit-rate;
- generating a second plot of average discrete cosine transform (DCT) residuals versus the zigzag DCT scan line location for the sample video frame encoded at a multiple of the first bit-rate;
- generating a difference curve of the first and second plot;
- matching a staircase curve to the difference curve; and
- mapping weights from the staircase curve to populate the FW matrix.

8. The method of claim 7, wherein the first bit-rate comprises a base layer bit-rate.

9. The method of claim 8, wherein the multiple comprises three times the base layer bit-rate.

10. The method of claim 7, comprising the further step of normalizing the staircase curve when the mapped weights determined from the staircase curve are larger than an upper limit of a number of bit planes in the FGS video coding system.

- 1 11. The method of claim 7, wherein the sample video frame is selected from a sample
- 2 video sequence having a predetermined scene characteristic.

1 12. A Fine-Granularity-Scalability (FGS) video encoding system that utilizes a
2 frequency weighting (FW) matrix to encode video data, comprising:
3 a system for determining a scene characteristic of the video data; and
4 a system for selecting an FW matrix from a plurality of FW matrices based on the
5 determined scene characteristic.

1 13. The FGS video encoding system of claim 12, wherein each of the plurality of FW
2 matrices are associated with one of a plurality of predetermined scene characteristics.

1 14. The FGS video encoding system of claim 13, wherein weights for each matrix are
2 determined from a staircase curve match of the average discrete cosine transform (DCT)
3 residuals calculated at a first and second critical quality bit-rate for a sample video frame.

1 15. The FGS video encoding system of claim 14, wherein the first and second critical
2 quality bit-rates comprise a base layer bit-rate and three times the base layer bit-rate.

1 16. The FGS video encoding system of claim 14, wherein the sample video frame was
2 derived from a video sequence having one of the plurality of predetermined scene
3 characteristics.

- 1 17. The FGS video encoding system of claim 12, wherein the determined scene
- 2 characteristic comprises a criterion selected from a group consisting of: a brightness
- 3 level, a motion amount, and an activity level.

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1 18. A program product stored on a recordable medium for generating a frequency
2 weighting (FW) matrix for use in a Fine-Granularity-Scalability (FGS) video coding
3 system, the program product comprising:
4 means for generating a first plot of average discrete cosine transform (DCT)
5 residuals versus zigzag DCT scan line locations for a sample video frame encoded at a
6 first bit-rate;
7 means for generating a second plot of average discrete cosine transform (DCT)
8 residuals versus zigzag DCT scan line locations for the sample video frame encoded at a
9 multiple of the first bit-rate;
10 means for generating a difference curve of the first and second plot;
11 means for matching a staircase curve to the difference curve; and
12 means for populating the FW matrix with weights mapped from the staircase
13 curve.

1 19. The program product of claim 18, wherein the first bit-rate comprises a base layer
2 bit-rate, and wherein the multiple comprises three times the base layer bit-rate.

1 20. The program product of claim 18, further comprising means for normalizing the
2 staircase curve when the weights determined from the staircase curve are larger than an
3 upper limit of a number of bit planes in the FGS coding system.

1 21. A Fine-Granularity-Scalability (FGS) video decoding system that utilizes a
2 frequency weighting (FW) matrix to decode encoded video data, wherein weights for the
3 FW matrix are determined from a staircase curve match of the difference of the average
4 discrete cosine transform (DCT) residuals calculated at a base layer bit-rate and
5 approximately three times the base layer bit-rate for a sample video frame.

1 22. The FGS video decoding system of claim 21, further comprising a system for
2 adaptively changing the FW matrix when a scene characteristic changes.